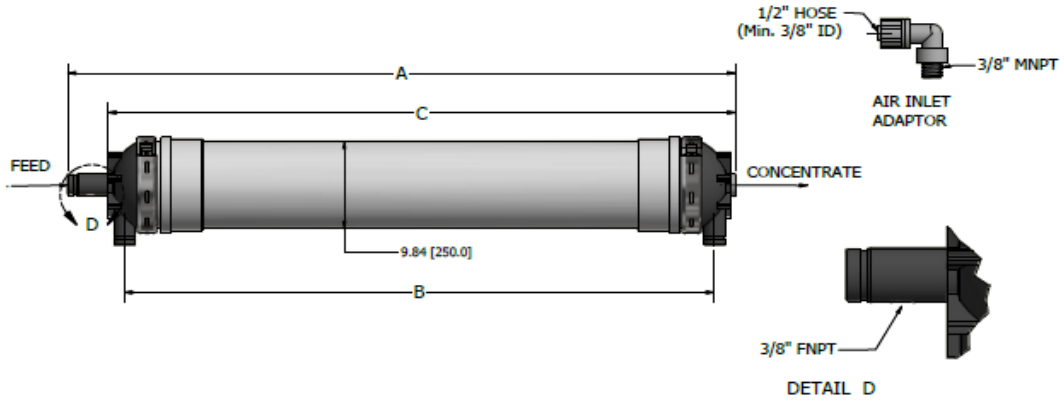
Capillary Ultrafiltration Module — HYDRAcap® MAX 80

Performance[1]	Filtrate Flow:	15.7 – 51.0 gpm (3.6 – 11.6 m^3/h)
	Filtrate Turbidity:	≤ 0.10 NTU
	Bacteria removal:	≥ 4 log
Type	Configuration:	Capillary Ultrafiltration Module
	Membrane Polymer:	TIPS PVDF
	Nominal Membrane Area:	1130 ft^2 (105 m^2)
	Fiber Dimensions:	ID 0.024" (0.6 mm), OD 0.047" (1.2 mm)
	Pore size:	0.08 micron
Application Data[2]	Typical Filtrate Flux Range:	20 – 65 gfd (34 – 110 l/m^2/h)
	Maximum Applied Feed Pressure:	73 psig (5.0 bar)[3]
	Maximum Transmembrane Pressure	30 psig (2.0 bar)
	Instantaneous Chlorine Tolerance:	5000 ppm[4]
	Maximum Chlorine Exposure:	1,000,000 ppm-hrs
	Maximum Feed Turbidity:	300 NTU[5]
	Maximum Operating Temperature:	104 °F (40 °C)
	pH Operating Range:	2.0 – 11.0
	Cleaning pH Range:	1.0 – 13.0
	Operating Mode:	Outside to Inside Filtration Dead End or Cross flow mode

Typical Process Conditions

Air Scour Rate:	7.3 – 9.1 acfm (12.3 – 15.4 m^3/h)
Air Scour Duration:	120 – 240 seconds
Air Scour Frequency:	Once every 20 – 60 minutes
Maintenance Clean Frequency:	1 – 3 times per day
Maintenance Clean Duration:	20 – 30 minutes
Disinfection Chemicals:	NaOCl, ClO_2 or NH_2Cl
Cleaning Chemicals:	NaOH, HCl, H_2SO_4, or Citric Acid



A, inches (mm)	B, inches (mm)	C, inches (mm)	Pipe connections	Dry Weight	Wet Weight
92.15 (2340.6)	83.11 (2110.9)	87.90 (2232.7)	2" Victaulic	135 lbs (62 kg)	260 lbs (118 kg)

Certifications: NSF61, NSF419 (US LT2ESWTR – Public Drinking Water Compliance)

[1] Typical module performance for most feedwaters.

[2] The limitations shown here are for general use. The values may be more conservative for specific projects to ensure the best performance and longest life of the membrane.

[3] At ≤20°C. 58psi (4 bar) between 21 - 30°C. 44 psi (3 bar) between 31 – 40°C.

[4] For 60 minutes or less.

[5] Higher values can be treated. Consult Hydranautics' technical staff.

Notice: Hydranautics also offers HYDRAcap® MAX 80-NON, which is a dummy module with no potting or fiber.
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Booster Pump, Compaction (7.0 °C)

Project name	UHPRO		1/3
Client Name	AM	Permeate flow/train	3.80 m3/h
Calculated by	VM	Total plant product flow	7.60 m3/h
HP pump flow	7.60 m3/h	Number of trains	2.00
Feed pressure	69.3 bar	Raw water flow/train	7.60 m3/h
Feed temperature	7.0 °C	Permeate recovery	50.00 %
Feed Water pH	8.12	Membrane age	2.0 years
Chemical dose, mg/l	None	Flux decline,per year	0.0 %
Pumping specific energy	6.37 kWh/m3	Fouling factor	1.00
Pass NDP	23.3 bar	SP increase, per year	0.0 %
Average flux	8.9 lmh	Inter-stage pipe loss	0.207 bar
		Feed type	Industrial Waste
		Pretreatment	MF/UF

Pass-Stage	Perm. Flow	Flow / Vessel Feed	Flow / Vessel Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Exhaust	Conc	Perm. TDS	Membrane Type	Membrane Quantity	PV# x Elem #
	m3/h	m3/h	m3/h	lmh	bar	lmh		bar	bar	bar	bar	mg/l			
1-1	2.1	7.6	5.5	9.2	0.7	13.4	1.02	0.0	0.0	0	68.6	242.7	PRO-LF1	6	1 x 6M
1-2	1.7	5.5	3.8	8.7	0.4	13.6	1.03	0.0	25.0	0	93.0	782.9	PRO-XP1	6	1 x 6M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	237.14	237.14	0.187	324.9	474.4
Ca	70.20	70.20	0.055	96.2	140.4
Mg	15.04	15.04	0.012	20.6	30.1
Na	22437.21	22437.21	169.304	30717.2	44731.7
K	21.47	21.47	0.202	29.4	42.8
NH4	572.13	572.13	6.132	782.3	1134.1
CO3	1.47	1.47	0.000	2.9	6.7
HCO3	54.06	54.06	0.771	73.0	104.3
SO4	10230.06	10230.06	20.338	14015.7	20452.0
Cl	26354.35	26354.35	209.248	36078.0	52530.7
F	0.25	0.25	0.004	0.3	0.5
NO3	1446.28	1446.28	84.980	1966.3	2809.3
PO4	2.51	2.51	0.005	3.4	5.0
OH	0.00	0.00	0.000	0.0	0.0
SiO2	50.03	50.03	0.281	68.5	99.8
CO2	0.57	0.57	0.57	0.57	0.57
NH3	40.91	10.42	10.42	10.42	10.42
TDS	**61255.07**	**61255.07**	**491.33**	**83853.94**	**122087.40**
pH	**8.12**	**8.12**	**6.45**	**8.24**	**8.38**

Saturations	Raw Water	Feed Water	Permeate Water	Concentrate	Limits
CaSO4 / Ksp * 100, %	12	12	0	28	400
SrSO4 / Ksp * 100, %	0	0	0	0	1200
BaSO4 / Ksp * 100, %	0	0	0	0	10000
SiO2 Saturation, %	48	48	0	88	140
CaF2 / Ksp * 100, %	0	0	0	6	50000
Ca3(PO4)2	0.0	0.0	-7.0	1.6	2.4
CCPP, mg/l	0.63	0.63	-1.04	10.72	850
Langelier index	-0.51	-0.51	-6.92	0.30	2.8
Ionic strength	1.11	1.11	0.01	2.21	
Osmotic pressure, bar	40.3	40.3	0.3	80.4	
TDS / Osmotic pressure, mg/l.bar	1427.0	1427.0	1389.9	1427.2	

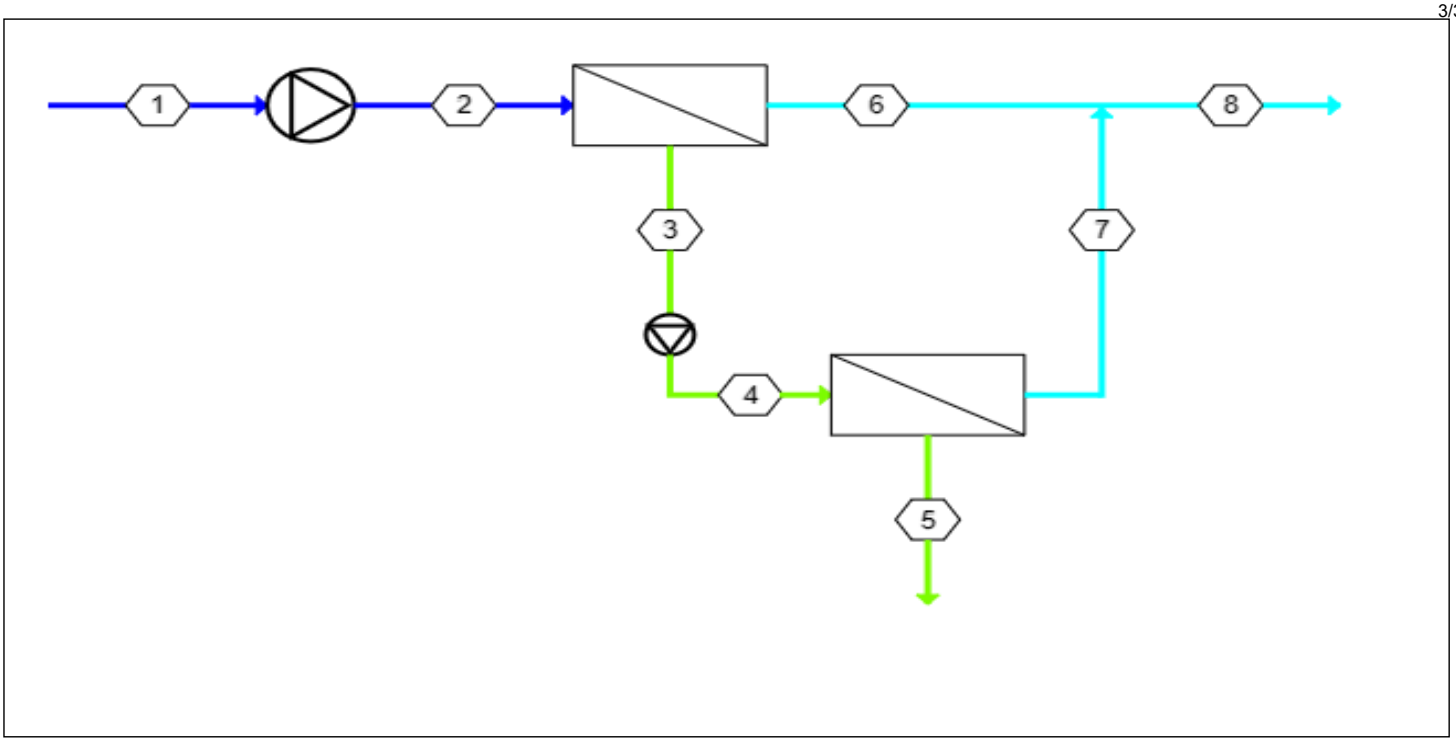
Booster Pump, Compaction (7.0 °C)

Project name	UHPRO		
Client Name	AM	Permeate flow/train	3.80 m3/h
Calculated by	VM	Total plant product flow	7.60 m3/h
HP pump flow	7.60 m3/h	Number of trains	2.00
Feed pressure	69.3 bar	Raw water flow/train	7.60 m3/h
Feed temperature	7.0 °C	Permeate recovery	50.00 %
Feed Water pH	8.12	Membrane age	2.0 years
Chemical dose, mg/l	None	Flux decline,per year	0.0 %
Pumping specific energy	6.37 kWh/m3	Fouling factor	1.00
Pass NDP	23.3 bar	SP increase, per year	0.0 %
Average flux	8.9 lmh	Inter-stage pipe loss	0.207 bar
		Feed type	Industrial Waste
		Pretreatment	MF/UF

Pass-Stage	Perm. Flow	Flow / Vessel Feed	Conc	Flux	DP	Flux Max	Beta	Stagewise Pressure Perm.	Boost	Exhaust	Conc	Perm. TDS	Membrane Type	Membrane Quantity	PV# x Elem #
	m3/h	m3/h	m3/h	lmh	bar	lmh		bar	bar	bar	bar	mg/l			
1-1	2.1	7.6	5.5	9.2	0.7	13.4	1.02	0.0	0.0	0	68.6	242.7	PRO-LF1	6	1 x 6M
1-2	1.7	5.5	3.8	8.7	0.4	13.6	1.03	0.0	25.0	0	93.0	782.9	PRO-XP1	6	1 x 6M

Pass-Stage	membrane no.	Feed Pressure	Pressure Drop	Conc Osmotic pressure	NDP	Permeate Water Flow	Flux	Recovery	Beta	Permeate (Stagewise cumulative) TDS	Econd (@ 7.0 °C)	Ca	Na	Cl
		bar	bar	bar	bar	m3/h	lmh	(%)		mg/l	µS/cm	mg/l	mg/l	mg/l
1-1	1	69.3	0.14	43.3	27.1	0.5	13.4	6.6	1.02	142.4	155.3	0.016	49.028	60.600
1-1	2	69.1	0.12	45.9	23.6	0.4	11.0	5.8	1.02	162.9	178.0	0.018	56.021	69.244
1-1	3	69.0	0.11	48.5	21.0	0.4	9.5	5.3	1.02	181.9	198.8	0.020	62.548	77.311
1-1	4	68.9	0.11	50.8	18.5	0.3	8.1	4.8	1.02	201.2	219.8	0.023	69.188	85.519
1-1	5	68.8	0.10	53.1	16.2	0.3	7.0	4.3	1.02	221.4	241.8	0.025	76.149	94.123
1-1	6	68.7	0.09	55.2	14.0	0.2	5.9	3.9	1.01	242.7	265.0	0.027	83.503	103.212
1-2	1	93.4	0.09	60.5	34.2	0.5	13.6	8.3	1.03	427.5	466.3	0.048	147.456	182.250
1-2	2	93.3	0.08	65.0	29.1	0.4	10.7	7.1	1.03	492.0	537.8	0.055	169.416	209.391
1-2	3	93.2	0.07	69.4	24.8	0.3	9.0	6.5	1.02	556.1	632.8	0.062	191.449	236.620
1-2	4	93.2	0.06	73.4	20.7	0.3	7.5	5.7	1.02	625.7	699.9	0.070	215.503	266.346
1-2	5	93.1	0.06	77.1	16.9	0.2	6.1	4.9	1.02	701.2	771.7	0.079	241.633	298.637
1-2	6	93.1	0.05	80.3	13.6	0.2	4.9	4.2	1.02	782.9	848.5	0.088	269.912	333.585

Booster Pump, Compaction (7.0 °C)



Stream No.	Flow (m3/h)	Pressure (bar)	TDS (mg/l)	pH	Econd (µS/cm) (@ 7.0 °C)
1	7.60	0	61255	8.12	58812
2	7.60	69.3	61255	8.12	58812
3	5.55	68.6	83854	8.24	79203
4	5.55	93.4	83854	8.24	79203
5	3.80	93.0	122087	8.38	113198
6	2.05	0	243	6.15	325
7	1.75	0	783	6.64	1041
8	3.80	0	491	6.45	659